

§Appl. No. 10/666,523  
Amdt. dated October 2, 2007  
Reply to Office Action of July 2, 2007

## **REMARKS**

### **Claim Amendments**

New claim 43 combines the limitations found in claim 21 and in claim 22 in specifying that the step of separating mixture (18) is performed in a second adsorption column operating as a simulated moving bed. Claim 21 has been amended to change the punctuation used. This amendment does not change the scope of the claims.

### **Rejections Under 35 U.S.C. §103:**

The Examiner has repeated the rejection of claims 21-37 and 39- 42 under 35 U.S.C. §103 based on the combined teachings of Magne-Drisch (U.S. Patent No. 6,369,287) and Lee (U.S. Patent 3,306,942). Applicants maintain the examiner still has not shown that the claimed invention is prima facie obvious. In *KSR International Co. v. Teleflex Inc.*, 82 USPQ 1385 (2007) the Supreme Court affirmed that the objective test for obviousness set forth in *Graham v John Deere Co.* 383 US1,149 USPQ 459, is still valid by citing *Graham*. The test in *Graham* requires a determination of the differences between the prior art and the claims at issue. When the claimed invention as a whole is compared to the combined teachings of the cited references, the differences are so significant that the claimed invention is clearly unobvious .

Significant differences are demonstrated by the fact that the combined teachings of the cited references do not show all of the elements of the claimed invention. For example, the cited references do not show the step of dehydrogenating a raffinate product containing metaxylene, orthoxylene and ethylbenzene in producing polystyrene. In addition, the cited references do not show the step of separating a mixture (18) containing mostly styrene, ethyl benzene, metaxylene and orthoxylene into a stream containing 99.8% styrene. The cited prior art (Lee US 3,306,942) teaches only the hydrogenation of essentially pure ethyl benzene (99.5-99.7%). Magne-Drisch is silent on how to hydrogenate ethylbenzene. The catalytic reaction products of Lee '942 do not contain metaxylene and orthoxylene, so there is no need to isolate them from the styrene product. In that

§Appl. No. 10/666,523  
Amdt. dated October 2, 2007  
Reply to Office Action of July 2, 2007

Magne-Drisch does not mention the hydrogenation of ethylbenzene, there is also no mention of isolating a styrene product from a reaction mixture of metaxylene and orthoxylene.

On page 12 of the office action, the examiner appears to acknowledge that the combined teachings of the cited references at most show dehydrogenation of a stream 9 which consists of 99% pure ethylbenzene. Applicants do not concede such as showing is made by the cited references but assuming it is, this is not the dehydrogenation step recited in claim 21 herein. The dehydrogenation step of claim 21 comprises dehydrogenating a “distilled raffinate product (9b) containing metaxylene, orthoxylene, and a minor amount of ethylbenzene compared to the xylenes.” In addition, this is no indication where the dehydrogenation step for ethylbenzene should take place in the processes of the cited reference. Applicants identified these differences in the last response. The examiner has not found these differences to be significant focusing instead on the results obtained by Lee ‘942.

Applicants submit that a proper obviousness analysis under the Graham test requires that the invention be considered as a whole, *In re Wright*, 848F2d 1216, 6 USPQ2d 1923(Fed Cir. 1990). The patent office is obligated to consider all the evidence of the properties of the claimed invention as a whole, compared with those of the prior art. *In re Dillon*, 919 F2d 688, 16 USPQ 2d 1897 (Fed Cir. 1990). When doing so, the methods claimed are clearly unobvious due the significant features, i.e. steps, which are absent from cited prior art.

Other features distinguish the methods claimed herein from the disclosures within Magne-Dirsch and Lee. Some of these are set forth in the dependant claims as follows:

Claims 22 and 43: These claims define methods where the step of separating styrene from the mixture (18) is performed by a second adsorption column. Neither of the cited references (Lee and Magne-Drisch) disclose how styrene is even isolated from the dehydrogenation reaction mixture let alone suggest such a column be used.

Claim 24: This claim defines methods where the step of adsorption of a feed stock is

§Appl. No. 10/666,523  
Amdt. dated October 2, 2007  
Reply to Office Action of July 2, 2007

performed with a column (6) operating in five zones. The column of Magne-Drisch is said to operate in 4 zones.

Claim 27 : This claim defines methods where the adsorbent used to isolate styrene is an X or Y zeolite. As mentioned above, the cited references do not even mention isolating styrene, let alone using an absorption column to do so.

Claim 38 This claim defines methods where a second stream is hydrogenated. The examiner has indicated this claim is allowable.

Claim 42 This claim defines methods where the minor amount of ethylbenzene in the raffinate product is about 7% by weight.

In view of the unique features discussed above, applicants maintain claims 1-43 are unobvious

**Obviousness-type Double Patenting:**


As set forth in the last response, there is clearly no basis for the provisional rejection of claims 21-37 and 39-42 under the doctrine of obviousness-type double patenting based on claims 1-20 of U.S. Patent 6,841,714. The claims of U.S. Patent 6,841,714 do not include a dehydrogenation step or the isolation of styrene and no evidence has been presented to show or suggest it would be obvious for one skilled in the art to modify the subject matter of the '714 claims and include these features. The methods of the '714 patent are not directed to the production of ethylbenzene or styrene, so there should be no concern that this application will extend the patent monopoly for the claims of the '714 patent. Applicants maintain that one skilled in the art would not be motivated to incorporate a dehydrogenation step and isolation step into the methods of U.S. Patent 6,841,714 to produce styrene. Therefore, the obviousness-type double patenting rejection should be withdrawn.

Based on the above remarks, Applicants submit that all pending claims are in a form suitable for allowance and patentable over the cited references. Therefore, withdrawal of the rejections and allowance of these claims are earnestly solicited.

§Appl. No. 10/666,523  
Amdt. dated October 2, 2007  
Reply to Office Action of July 2, 2007

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Richard J. Traverso', written over a horizontal line.

Richard J. Traverso, Reg. No. 30,595  
Attorney/Agent for Applicant(s)

MILLEN, WHITE, ZELANO  
& BRANIGAN, P.C.  
Arlington Courthouse Plaza 1, Suite 1400  
2200 Clarendon Boulevard  
Arlington, Virginia 22201  
Telephone: (703) 243-6333  
Facsimile: (703) 243-6410

Attorney Docket No.: PET-2102

Date: October 2, 2007